
**BioRES- Sustainable Regional Supply Chains for Woody Bioenergy**

# Report about Potentials and Limitations for the Transfer of Good Practise Examples

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## Content

## List of abbreviations

| | |
|---|---|
| BLTC | Biomass Logistic and Trade Center |
| cbm | cubic meter |
| CHP | Combined Heat and Power |
| DH | District Heating |
| DKTI | German Climate and Technology Initiative (Deutsche Klima- und Technologieinitiative) |
| doo | Limited Liability Company |
| EBRD | European Bank for Reconstruction and Development |
| ENplus | Wood Pellet Quality Certification |
| FSC | Forest Stewardship Council |
| GHG | Green House Gas |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit |
| ha | Hectare |
| KfW | German Development Bank (Kreditanstalt für Wiederaufbau) |
| km | Kilometer |
| kWh | kilo Watt hour |
| LNG | Liquid Natural Gas |
| MW | Megawatt |
| NP | National Park |
| PE | Public Enterprise |
| PEFC | Programme for the Endorsement of Forest Certification |
| PJ | Peta Joule |
| PPP | Public and Private Partnership |
| PSEMR | Provincial Secretary for Energy and Mining |
| PSP | Provincial Secretary for Agriculture |
| RES | Renewable Energy Sources |
| szr | Independant Craftsmen Store |
| t | Ton |
| UNDP | United Nations Development Programme |
| WP | Work Package |

## BioRES project overview

BioRES aims at introducing an innovative concept of Biomass Logistic and Trade Centres (BLTCs) in Serbia, Croatia, and Bulgaria based on cooperation with technology leaders from Austria, Slovenia, Germany, and Finland. The **overall objective** of BioRES is to increase market uptake of domestic supply chains for quality-controlled woody bioenergy products from sustainable forestry and wood residues by means of developing BLTCs as regional hubs. With this overall objective, BioRES will contribute to fostering the development of the bioenergy sector, implementing woody bioenergy as a reliable and standardised fuel, and to ensuring its sustainability by means of instigating the use of verified woody bioenergy supply.

## Summary of Results

11 good practice examples of operating BLTCs are analyzed and their transferability to the country –specific context of establishing new BLTCs in Bulgaria, Serbia and Croatia evaluated: from Austria (4), Finland (3), Germany (2) and Slovenia (2). Based on the description of business models and technological facts the SWOT analysis tool of good practices analyses was carried out by potential operators during workshops in selected priority locations of the three countries. The good practice examples were divided into three main categories based on the business models; co-operative, limited liability company and networking company. The pre-selected cases were introduced in the workshops for participants. This report presents the synthesis of SWOT analyses. In all three implementing countries, the biomass potential and market development were seen as strengths and creation of new jobs as opportunities for priority locations. The common challenges (as threats or weaknesses in SWOT framework) for the development of BLTCs are the lack of skilled operators, financing possibilities, legal frameworks and little political support. The cooperative and limited liability models were evaluated in all three implementing countries and also networking company model in Bulgaria. Common strength for all business models in all three countries is the communities' willingness to support the use of woody biomass. The results of this report will be used in training of stakeholders in implementing countries to draw lessons from European good practice examples. Moreover, the report and SWOT synthesis will increase stakeholders understanding on BLTC business models.

## BioRES definition of BLTC

As defined by the project, "*Biomass Logistic and Trade Centres (BLTCs) are local or regional centres with optimised logistics and trading organisation, where different woody bioenergy products (and/or heat) are marketed at standardised quality focusing on the domestic market uptake. It's an innovative business model competitively operating as an intermediator to organise local woody bioenergy value chains between local biomass suppliers and customers of different scales from private households up to large heat and power plants. In Slovenia, Austria, Germany and Finland BLTCs of different shapes with own production, storage and logistic facilities are competitively operating*."[1]

[1] http://www.bioresproject.eu

At the initial investment stage, a BLTC can be a marketing and sales platform and can develop into a BLTC with its own production, storage and logistic facilities when the local market reaches critical volumes allowing the amortisation of investments.

# 1. Overview of good practise BLTC examples

## 1.1 Introduction to the business models for BLTC

This chapter presents three typical business models for a BLTC. It is important to notice, that a BLTC is not always a representation of a single business model but often a combination of different business models. Moreover, a business model might change during the operation from one form to another due the business development.

**Cooperative:**

A cooperative is a legal entity which is owned and controlled by its members. Members often have a close association with the enterprise as producers or consumers of its products or services, or as its employees. The United Nations define a cooperative as *»an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise.*« The co-operative model is flexible and may be applied to different purposes from social services to business ventures.

A cooperative as an operator model for a BLTC is useful when main deliverers of BLTC are farmers or forest owners, typically rather small forest area. Members of a cooperative hold a share which is connected with a certain forest area and a fixed delivery amount of wood per year. The cooperative has to take every year the defined delivery amount of wood from each member. The members are liable up to certain percentage of the share value which were bought at the beginning of membership.

The idea of a cooperative is not always to make the highest business profit, but to pay a good and fair market price for the energy wood from the members.

Cooperative has usually a general meeting which selects the board of a cooperative. The board makes the decisions related to the cooperative operation and development. The cooperative may also have hired employees susch as operative managers and operators.

In BioRES project, the special emphasis is on energy cooperatives.

**Limited liability company (Ltd./Lld./Gmbh)**

A limited liability company is a type of legal entity very common in Germany and Austria for instance. The main task of a limited liability company is to be profitable in its operation and thus generate profit for its owners.

The owners have to invest their own capital for the company. The minimum share capital required to establish varies between countries, but for instance in Germany it is EUR 25,000

and in Austria EUR 35,000 (can also be made up of contributions in kind). At the time of registration, 50% of this liability amount in cash.

A limited liability company is managed and legally represented by its managing directors (at least one managing director is usually required). By issuing binding instructions or directions to the managing directors, the owners may exercise direct influence on the management of the company. In order to be valid, a limited liability company must be entered into the commercial register.

A limited liability company is an operating model for a BLTC especially, if there's no forest ownership involved in the business. The limited liability company may have full supply chain services from harvesting and transportation of raw material, production of wood energy products and/or heat services and finally sales and delivery, or it can be only a sales platform of products.

**Networking company**

A networking company is a business model, where a group of companies establish together a new company which is administrating the operations through its member companies. The member companies are also members of the board of a networking company and thus they are actively involved in the decision making of a networking company.

As in limited liability company, also a networking company has a managing director who is selected by the board of a networking company.

The benefit of a business model is that network combines the expertise and resources of individual companies and thus even out the seasonal challenges of operational environment by a more wide spectrum of services. The member companies are responsible to give their own resources for the benefit of other companies in the network.

## 1.2 Best practice examples from Austria[2]

**BLTC Biomassehof Leoben**

Biomassehof Leoben is one of the largest BLTC's in Styria. At the establishment phase, a cooperative was used as operator model. The main reason to choose a cooperative model was that other farmers and forest owners which were not the members of the regional forest owner association were able to be members of this cooperative.

[2] http://bioresproject.eu/wp-content/uploads/2015/09/deliverable_3.1_web_ENG_V2.pdf

**Picture 1: Chipping of wood at the BLTC Leoben. Photo: Maximilian Handlos**

The main initiator of the cooperation was the regional forest owner association. The idea for a BLTC was developed after a naturel disaster and the problem of marketing energy wood. The main investments in the beginning of the BLTC were the weighbridge and the oven for measurement the quality of production. All investments were financed by their own financial resources. Four years from the start, the cooperative sold the company to the limited liability company Waldverband Steiermark (forest owner association) GmbH, because more than 93% of the members from the cooperative were the members of the Waldverband Steiermark GmbH also.

The main products of the BLTC are wood logs and wood chips for local industrial customers, municipalities and private households. Leoben also offer the service of thermal contracting. The BLTC provides a delivery service, but the customers can also pick up the products from the BLTC site. The benefits of BLTC Leoben are the high quality of the products, the security of supply for customers and the possibility for the farmers to sell energy wood regionally. Another benefit for the region is a fixed supplier for renewable energy. Customers in the region are able to choose a wood heating system, such as woodchip for small manufacturers and split logs for private customers. The BLTC in Leoben is efficient and economic, running with small investments and producing large quantities of products for the use in the region.

Factsheet:

| | |
|---|---|
| Operation started | 2010 |
| Owners/members | Forest association/Waldverband Steiermark GmbH. 400 members with 13 000 hectars of forests |
| Number of employees: | 1.5 - One employee for the manual work on this BLTC. The other employee (0.5) is the coordinator, who does the work of sales and marketing with the suppliers, product providers and customers as well as human resource management, further development of the BLTC and representation |
| Customers | Industrial businesses, municipalities, private households |

| | |
|---|---|
| Facilities: | Office container, storage, loader, a weighbridge, a telescopic forklift, a dryer (oven) and a packaging machine |
| Products and quantities: | - wood chips: 40 000 m3<br>- firewood: 600 m3 |

*Positive aspects in establishment and operation:*

- Good transport connection
- Central location, next to motorway (3-4 km)
- Location between two larger towns with the scope of 150000 inhabitants
- Cost savings through the acquisition of the old saw mill (hall, asphalt area)

*Challenges:*

- The BLTC is near a housing area – problems with noise and dust
- Authority procedures

**BLTC Biomassehof Raabtal**

The Biomass Trade Center Raabtal is a limited liability company. The owner structure is a mix form of private people, associations and community. The BLTC has a special social focus on employment of long-time unemployed people from the region.

The Idea for a BLTC as social business came from the Styrian chamber for agriculture in cooperation with the regional forest owner association. The main task is to bring unemployed people back to the labor market. The BLTC is producing woody biomass based products for the region and offers services and work for forest owners, companies and communities. The BLTC organization is very flexible for the benefit both BLTC and workers.

The BLTC buys mainly round timber and wood chips mostly from local forestry operators and from the forest owner association. They process also split logs and wood chips of different quality and kind. In addition, BLTC offers also gardening services.

The main investment in the beginning was the storage hall and the social area for the employees. Some machines are used in combination with other companies on this location which enables low investment costs. The needed investments were financed by credits and own capital.

**Picture 2: BLTC Raabtal. Photo: Armin Bostjancic**

Factsheet:

| | |
|---|---|
| Operation started | 2011 |
| Owners/members | Maschinenring and forest association Weiz |
| Number of employees: | 1 + 3-4: One managing director and the other employees are long-time unemployed people which work for 6-8 months in groups for BLTC. |
| Customers | Industrial businesses, municipalities, private households |
| Facilities: | three buildings for production, office room, a weighbridge in co-use with biogas plant, drying of wood chips with process heat from biogas plant, tractors from members, , a telescopic forklift, a dryer (oven) and a packaging machine |
| Products and quantities: | - wood chips: 10 000 m3<br>- firewood: 500 m3 |

*Positive aspects in establishment and operation:*

- BLTC is located in an industrial area specialized on biomass
- Cooperation with the biogas facility nearby
- The biomass boiler producer KWB is nearby
- Market co-operation through the local initiative “ZUERST”
- Short distance to the customers
- Good availability through the nearby motorway

*Challenges:*

- Within the industrial area, the BLTC is a bit hidden
- There are a lot of small local competitors (small private biomass suppliers) within the supply radius of the BLTC

**BLTC Frestritz/Hamker**

The BLTC Hamker is a one person company in close cooperation with the working community BLTC Fürstenfeld. In the beginning this BLTC was an experiment for another

biomass supply system. The main reason for investment was that several farmers use their own private farm as a storage and delivery location. The benefit of this BLTC is the short distance from the producer to the customer and the economic value created for the farmers.


**Picture 3: BLTC Feistritz/Hamker. Photo: Christian Metschina**

The owner invested on a storage hall and a machine for producing split logs. All investments were done by the company. The main products are split logs and woodchips. The woodchips are produced directly in the forest and delivered to the regional heating plant.

The cooperation partner is the working community BLTC Fürstenfeld, which also have economic benefit (share from turnover) from the cooperation. This asset is used for marketing, promotion and for cost of the running business.

Factsheet:

| | |
|---|---|
| Operation started | 2011 |
| Owners/members | 1 forest owner |
| Number of employees: | 1 |
| Customers | Industrial businesses, private households |
| Facilities: | wood chips storage (1500 m3), loader, tractors, tippers. Also synergies with existing facilities for weighbridge and a dryer. |
| Products and quantities: | - wood chips: 8 000 m3<br>- firewood: 150 m3 |

*Positive aspects in establishment and operation:*

- A lot of resources are available at this location
- Short distance to the customers
- The owner of the BLTC owns a forest, which is in the radius of 10-15 km and supervises a forest where wood is supplied from. *Challenges:*
- No good connection to rail-and motorway

**BLTC Naturwärme St. Lambrecht**

The BLTC Naturwärme in St. Lambrecht is an additional biomass products sale platform for the existing heating plant. It's a cooperative with several kinds of members such as 14 regional farmers and the parish St. Lambrecht. Originally the cooperative was founded in 1992. The location has several storage halls for operations. One of these halls has a technical drying system for wood chips, which is using the warm air from the roof structures. The warm air is extracted and then blown into the wood chips storage.

The BLTC St. Lambrecht produces mainly high quality wood chips and split logs for private customers. Wood chips with a low moisture content (~15%) is one of the advantages. It is a good BLTC example because it's a combination of producing energy for the community, small entrepreneurs and private people producing quality wood energy products for private costumers.

Factsheet:

| | |
|---|---|
| Operation started | 2011 |
| Owners/members | Cooperative Heat delivery cooperative/Wärmeliefergemeinschaft St. Lambrecht. 14 local farmers and the Benedictine Abbey St. Lambrecht. |
| Number of employees: | 1.5 |
| Customers | Industrial businesses, private households |
| Facilities: | Wood chips storage (1500 m3), loader, tractors, tippers. Also synergies with existing facilities for weighbridge and a dryer. |
| Products and quantities: | - wood chips: 5 000 (1 500 m3 from forest residues) m3<br>- firewood: 300 m3 |

*Positive aspects in establishment and operation:*

- The district heating is nearby
- Short distance to the town St. Lambrecht
- Central location
- Good transport connection

## 1.3 Best practise examples from Finland[3]

Best practise examples from Finland are two energy cooperatives and a networking company. Both energy cooperatives and a networking company are utilising local forest biomass for wood chips production. Wood chips are produced by local companies (subcontractors) and used mainly in cooperative's own heating plants to produce district

[3] http://bioresproject.eu/wp-content/uploads/2015/09/deliverable_3.1_web_ENG_V2.pdf

heat for their customers. The subcontractors in the energy cooperatives supply chain are producing also wood chips for other customers in the region. The networking company sells the energy wood or wood chips either to other customers or produces district heat in their own heating plant. Thus the BioRES definition of BLTC fits also with Finnish best practise examples.

**Eno Energy cooperative**

Eno Energia is a community-based district heating cooperative located in Eno village (city of Joensuu) in North Karelia, Finland. The cooperative was established in 1999 and it's owned by local forest owners. Nowadays, it has 52 members.

The aim of the cooperative is to produce district heat for the local community from local forest biomass resources, a part of which comes from its members.

**Picture 4: Eno Energy Cooperative, Alakylä heating plant. Photo: Eno Energia.**

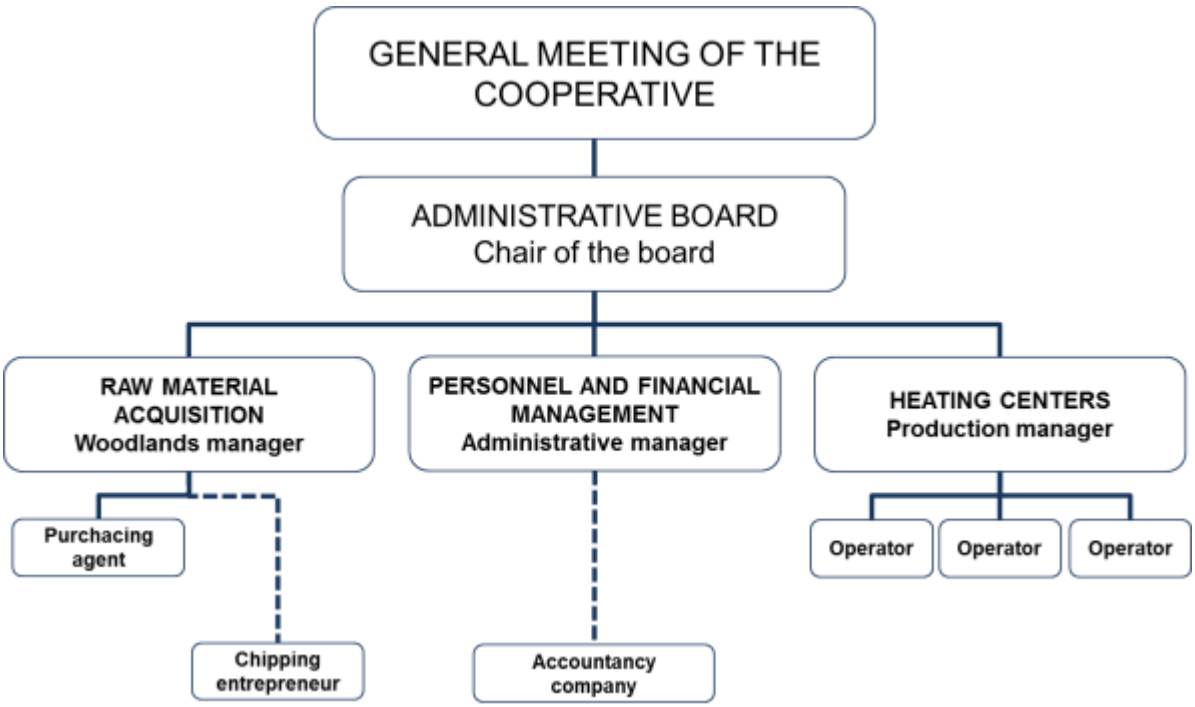
The activities of the cooperative are based on economic profitability and all the done work is compensated for. Local activity and local benefits are central strengths of this community-based initiative. The main benefits of cooperative operations are for instance inexpensive heat, local forest owners' income from selling energy wood, advanced management and growth of young forests, decrease of net carbon dioxide emissions by replacing fossil fuel with renewable forest chips and local communal activities and social contacts between people in general.

The establishment of cooperative was a joint effort of local actors. The municipality of Eno (nowadays part of city of Joensuu) wanted to change the source of district heat from oil to wood and advance rural development. The Local Forestry Centre wanted to advance forest

energy related development in the region. Finally, the local forest owners had a positive attitude towards the establishment of energy co-operative.

The first investment for heating plant and district heat distribution network investment was made by the Eno municipality. Later the cooperative purchased these facilities and expanded its activities. Currently the co-operative owns three heat plants and the district heat distribution network in the local community and in addition it also supplies one private customer with heat from wood pellets and one private heat plant with forest chips

The cooperative finances its operations with the profits from district heat production. Profits are used for running costs, new investments and also renovations of the heating plants. Surplus is shared between cooperative members. This encourages members to sell energy wood to the cooperative and acts as an incentive.




**Picture 5: Organizational chart of Eno Energy Cooperative. Graph: Eno Energia**

Factsheet:

| | |
|---|---|
| Operation started | 2000 |
| Owners/members | 52 members; forest owners), Cooperative is being managed by a board and a chairman of the board, which also decides about new investments and using the profits |
| Number of employees: | 5 in the cooperative (7-10 jobs created indirectly in fuel procurement and chipping). |
| Production and Customers | 27000 m³ loose wood chips, Heated volume 291 000 m³, Heat production: 15 200 MWh for primary and secondary school buildings, high school, library, sports hall buildings, health centres, fire station, old people's home, business premises, church hall and |

| | |
|---|---|
| | terraced houses |
| Facilities: | Bio boilers in the plant of Alakylä : 1.2 MWth + 0.8 MWth Yläkylä : 0.8 MWth and Uimaharju 1 MWth + 1 MWth<br>Fuel storages: 100 loose-$m^3$ to 300 loose-$m^3$ |

Eno energy utilizes forest biomass from its members' forests and in addition it's also buying wood from local markets. The use of wood is approx. 27 000 loose-m3 of woodchips, which originates from thinnings and clearcuts from local forests (small tree manual felling 15 %, mechanized harvesting 70 %, logging residues 15 %).

*Positive aspects in establishment and operation:*

- Utilisation of available local forest resources
- Eno Energy cooperative has a strong municipality support throughout the planning and implementation
- Cheaper heat for consumers compared to light fuel oil, conserves approximately 2 million liters of oil annually, about € 2 000 000 saved within the local economy, carbon dioxide emissions reduced by about 5 million kilos annually, additional annual employment equivalent to 7-10 man years.

*Challenges:*

- In the planning phase of the first district heating plant there were delays due to discontinuity in government processes and support decisions
- In actual implementation phase minor delays occurred which caused the budget to exceed
- In the beginning the client base and markets were insufficiently mapped in one municipality where the cooperative invested.

**Tuupovaara Energy cooperative**

Tuupovaara energy cooperative was established in 1996 by 8 members. The business concept is to produce district heating energy by providing woodchips for the two heat production/distribution plants.

The main driver for establishment was Tuupovaara municipality's willingness to support the foundation of an energy cooperative. Before the establishment, a feasibility study concerning the potential of heat customers and sufficient number of forest owners to secure the supply of raw material for heating plant was made. The agreement for heat deliveries was made for 15 years, which encouraged the members to proceed with the establishment.

In 2006, The city of Joensuu and Tuupovaara municipality merged, and with the support of new municipality, the investment to connect two separate district heating networks was carried out. This enabled total oil free production of heat for the Tuupovaara town. Nowadays, the cooperative has more than 70 members.

The cooperative is running two heating plants; Pätsi (owned by city of Joensuu) and Roihu (owned by Tuupovaara energy cooperative). They have 7 customers, the city of Joensuu being the largest individual customer.

Local heat energy production provides work for the community, keeps carbon dioxide emissions from energy production low, and it is also cost effective. The cooperative buys raw material locally, as delivered to the road-side by forest owners. The procurement radius is only 20 km. High quality wood chips are made from stem wood from young forest thinnings. Chipping services are bought from a local entrepreneur, who is also a member of the Tuupovaara cooperative.

Factsheet:

| | |
|---|---|
| Operation started | 1996 |
| Owners/members | City of Joensuu / 71members of the cooperative |
| Customers | Municipal offices, health center, Nursing home/service center, townhouse (36 000 m3 of heated space) |
| Facilities: | wood chips storage (1500 m3), loader, tractors, tippers. Also synergies with existing facilities for weighbridge and a dryer. |
| Products and quantities: | - wood chips: 8 000 m3<br>- firewood: 150 m3 |

*Positive aspects in establishment and operation:*

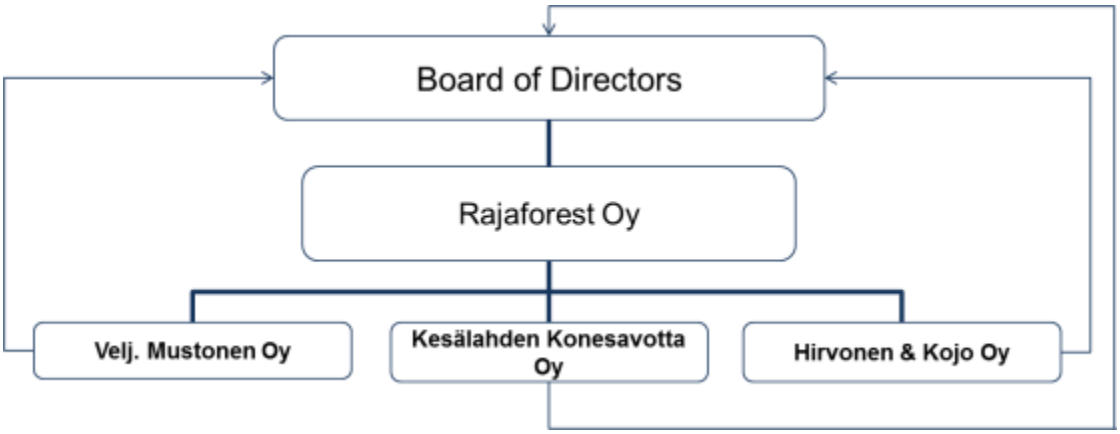
- Potential markets and available forest resources in the area.
- Strong support from the municipality officials: Cooperative was formed based on municipality initiative and got strong support later on from municipality officials and from local bank
- Local Centre for Economic Development, Transport and the Environment helped the cooperative with funding and investment planning.
- Good project planning: Cooperative invested in own district heating plant in 2001, which could be seen as an example of good practice.

*Challenges:*

- Community`s negative attitudes and views of new district heating plant project before building the first district heating plant. Once the first plant was operational and people could see the actual results, attitudes changed quite rapidly.
- Misevaluation of (storage) capacity; cooperative first failed to evaluate their chip storage capacity and built too small storage space which made first winter operations quite difficult.

**Rajaforest Oy**

Rajaforest Oy, founded in 2004, is forest harvesting company (Ltd.), which is governed by its member companies. Together these partners and subcontractors form a networking company which is a group of legally independent companies or subsidiary business units that use various methods of coordinating and controlling their interaction in order to appear like a larger entity. Three main types of network organization are typically seen: (1) internal where a large company has separate units acting as profit centers, (2) a central company outsources some work to others, and (3) a network integrator outsources heavily to other companies. Rajaforest Oy is an example of this.




**Picture 6: Organisational chart of Rajaforest Oy. Graph: Tanja Ikonen, Luke.**

The company's business concept consist of two main business fields: wood harvesting and transport, and heat entrepreneurship. Rajaforest Oy is buying energy wood from local private forest owners and sub-contractors operating in the company`s network. Partners and subcontractors in the company network are harvesting, transporting and chipping energy wood to the two Rajaforest own heating plants.

By investing in district heating, the company`s aim was to have another area of business alongside the core business of wood harvesting and transportation. The original idea to expand the business into bioenergy production came from local bioenergy cooperative chairman who convinced the young company that they are capable of doing business in the field of bioenergy and that markets are available. This expansion supports the company outside the peak harvesting season and brings more even cash flow during the year.

The company owns four district plants and the district heating network in the area. Target customers are the municipalities of Kesälahti and Tohmajärvi, in Eastern Finland.

Factsheet:

| | |
|---|---|
| Operation started | 2004 |
| Owners/members | Rajaforest is operating on a corporate network basis; company is governed by its |

| | |
|---|---|
| | partners. Company has one employee who runs the daily work. Management and the decision making is being done by a board and a chairman of the board. |
| Number of employees: | 1 + 1-2 indirectly. Employess of member companies |
| Customers | Tohmajärvi & Kesälahti municipalities (municipal buildings), private nursing home, kindergarten, sports hall |
| Facilities: | Three heating plants in Tohmajärvi: 0,5 MW + 0,2 MW + 1,0 MW and one in Kesälahti 1,0 MW + 1,5 MW.<br>District heating network 3500 m |
| Products and quantities: | Annual sales of heat energy 5 500 MWh in Kesälahti and 1 700 MWh in Tohmajärvi.<br>Fuel consumption: 1 900 loose-$m^3$ of wood chips (Tohmajärvi), 10 000 loose-$m^3$ (Kesälahti) |

*Positive aspects in establishment and operation:*

- Advanced local entrepreneurship. As a result of Rajaforest`s district heat production 1-2 new jobs has been created.
- Harvesting small-size energy wood has also a positive effect on forest growth and local landscape.
- Operating with a networking principle has divided the company`s management structure and made it more democratic.
- The municipalities were willing to change from oil to renewable wood-based energy and use available local forest resources.
- Strong support from the bank throughout the planning and implementation phase; The local bank understood the nature of bioenergy business in general.
- Good planning and cooperation with the boiler manufacturer; the help and expertise received from manufacturer`s side speeded up the process

*Challenges:*

- Communication with municipality officials was challenging especially in the starting point. It also resulted to some miscalculations of potential client base and company's information about the number of households going to connect to the grid was not correct.
- a major industrial client pulled out of the project. This resulted in relocation of the plant and recalculation of the boiler size.
- In the beginning people's attitudes were negative towards a new district heating plant project. Especially those residents who were directly affected by the district

heating network were negative and those who were not, remained neutral. Once the first plant was operational and people could see the actual results, attitudes changed quite rapidly.

- Also some delays occurred, unexpected problems on boiler manufacturer`s size and bureaucracy caused by the environmental authorities in the planning phase, the implementation delayed almost two years.

## 1.4 Best practise examples from Germany[4]

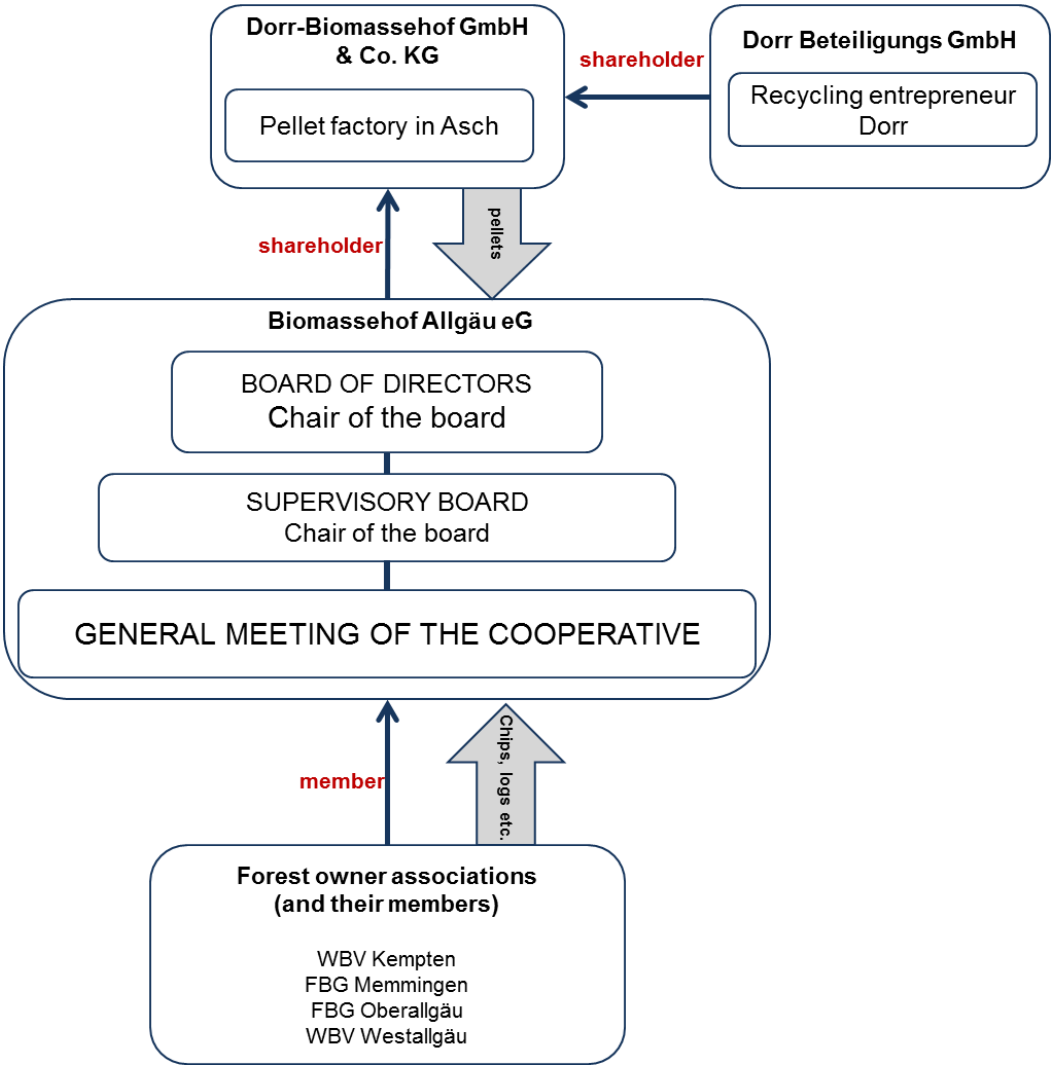
### Biomassehof Allgäu eG


**Picture 7: Biomassehof Allgäu eG. Photo: Biomassehof Allgäu eG**

Biomassehof Allgäu was founded 1997 through an initiative by the „forest owner association Kempten Land und Stadt e.V.“ and operation started in 1999. Since 2008 it is a cooperative between forest owners, medium-sized entrepreneurs and private persons. Today the BLTC cooperative has 320 members with an equity ratio of 80%. In order to avoid concentrated influence and to prevent takeover each member can’t have more than 10% of votes at the annual general meeting. 90% of the wood raw material comes from the region, 10% of the wood from Bosnia-Herzegovina.

The BLTC is selling around 25000 t/yr of pellets which are produced at their own pellet factory 60 Km from the BLTC. Briquettes, wood chips and dried splitted firewood are available in various assortments and different quality categories. The Biomassehof Allgäu has 18 employees (including 6 in part-time) and provides wood fuels to more than 10,000 customers. Ca. 100.000 m³ wood chips is annually provided to three heating plants in the region, whereas one heating plant is managed in cooperation with the BLTC.

[4] http://bioresproject.eu/wp-content/uploads/2015/09/deliverable_3.1_web_ENG_V2.pdf




**Picture 8: Organisational structure of Biomassehof Allgäu eG. Graph origin: Biomassehof Allgäu, redrawn by Robert Prinz, Luke.**

The Biomassehof Allgäu is buying readymade wood chips or organizes the own production of wood chips. As regional large-scale buyer and seller, the Biomassehof Allgäu is able to ensure high quality standards of fresh wood chips. Forest owner associations provide raw material to the roadside which is then chipped directly to the trucks and brought to the biomass storage or to heating plants. The district heating systems of the cities Sonthofen and Kempten are based on chip deliveries by the Biomassehof. The Biomassehof Allgäu is providing fresh wood chips as well as dried chips according to EU standard.

Around 5-6000 loose m³ splitted fire wood is sold mainly from small-diameter trees from sustainable forest management. Logs are produced using fully-automated splitting and cutting machines from small-diameter trees derived from thinnings, curved stems or other reasons affecting the quality. Readymade logs are stored in boxes and are dryed using pellet dust and residues for producing drying heat. Drying chambers dry the logs to a moisture content of approximately 18%. High quality fire wood is then available in different assortments stored in covered storage halls during the whole year for direct sale to end-consumers at the BLTC.

The associated pellet factory produces 50,000 tons of ENplus certified pellets annually. The certification and auditing costs for ENplus certified pellets are perceived as low in relation to the annual sales (< 0.5 %). The Dorr-Biomassehof GmbH & Co. KG also became shareholder at the sawmill Pröbstl located at the same site in order to ensure the supply of sawmill residues to the pellet factory. Through the pellet factory the Biomassehof involves a total of 22 forest owner associations representing about 25,000 small and private forest owners. For construction of the storage halls the BLTC received financial support from the Bavaria state. At present the BLTC operates competitively on the market without any subsidies. The marketing work of the BLTC is focusing on reaching end-consumers directly allowing better profit margins and staying in close contact with heating plant and boiler installers, being present at fairs and in local newspapers and internet.

Factsheet:

| | |
|---|---|
| BLTC start of operation | Since 1999 |
| Owners/members | 4 forest owner associations (WBV Kempten, FBG Memmingen, FBG Oberallgäu, WBV Westallgäu), 80 forest owners, 10 foresters, 7 saw mills, City of Kempten, Zweckverband für Abfallwirtschaft Kempten, Raiffeisenbank im Allgäuer Land, enterprise Dorr and private persons |
| Number of employees: | 18 (including 6 in part-time) |
| Customers | ~10,000 |
| Facilities: | Automatic filling station for 4 own pellet trucks at the BLTC Biomassehof Allgäu, wood chip supply to2 Biomass heating plants and 1 co-generation power plant (combined heat and power 8 MW) and pellets and logwood for private households in a radius up to 100 km |
| Products and quantities: | Pellets: 25.000 t/a<br>Wood chips: 100.000 SRM/a<br>Briquettes: 1.500 t/a<br>Logwood spruce and beech: 5000-6000 loose $m^3$ |

*Positive aspects in establishment and operation:*

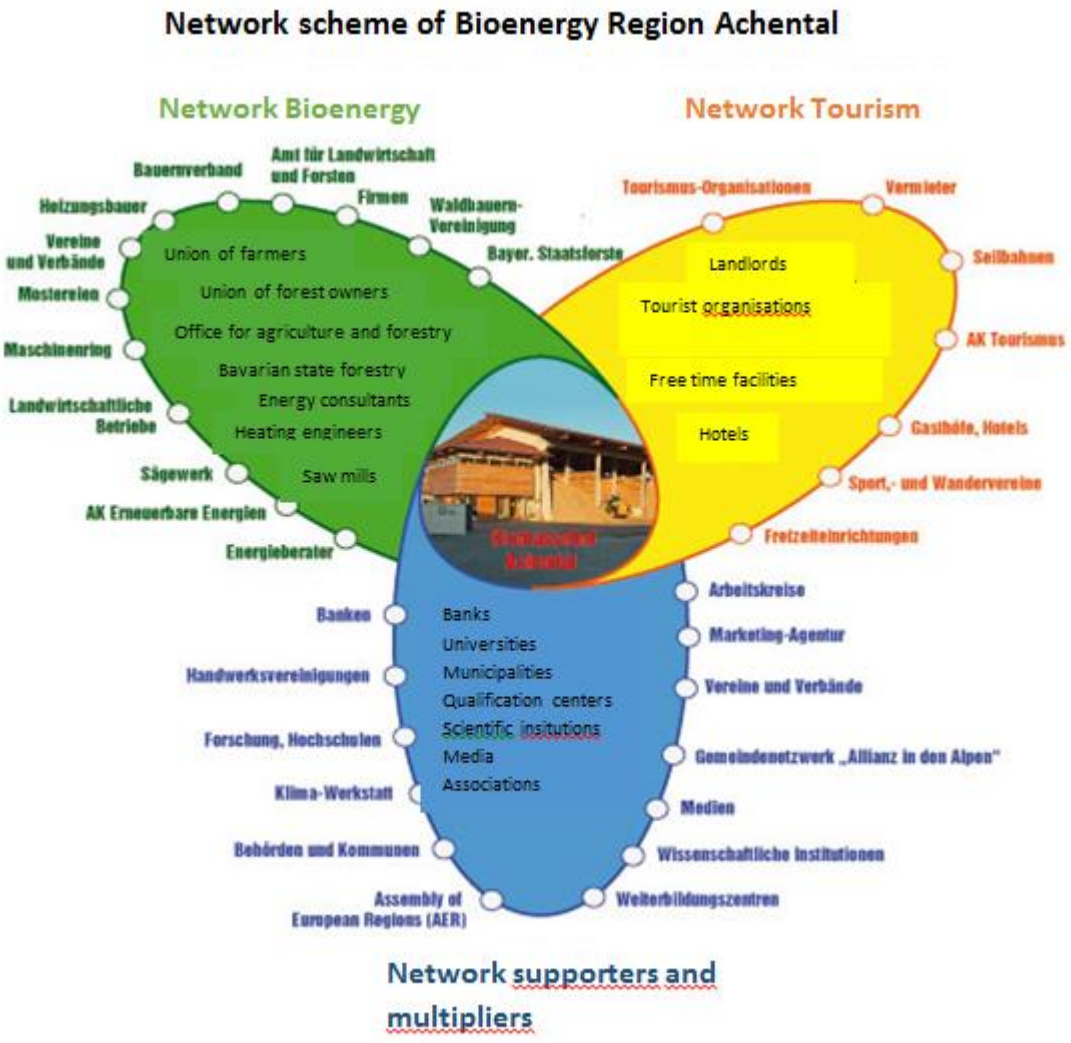
- The heating market has the highest share of energy consumption of about 50 percent. Heating with regional raw material delivered from short distances is environmental friendly and supports the regional economy. Direct beneficiaries of the Biomassehof Allgäu are eight medium-sized sawmills, ten forest-, two logistics- and three chipping entrepreneurs.
- Forestry has a long tradition in the Allgäu region, and enough raw material is sustainably growing The Biomassehof only uses PEFC certified wood.
- By producing pellets and providing wood fuels to customers as well as district heating systems around 33 Million liters of heating oil are replaced annually.

- In addition, through forest owner associations, the Biomassehof strengthens the market position of small and private forest owners; approximately 60 percent of forests in the region Allgäu and Oberallgäu are privately owned.

### Biomassehof Achental

The history of the Biomassehof Achental goes back to 1999 when the mayors of eight Achental municipalities institutionalized their cooperation and found the association the eco–model region „Ökomodell Achental e.V.“. A next milestone was reached in 2006 when Achental was selected as „Best Practice Region for European Union project „RES Integration“. Finally, in 2007, the BLTC Biomassehof Achental was founded as a public-private-partnership “Biomassehof Achental GmbH & Co KG” which constructed the center in 2008. In 2009 the district heating network of the village Grassau was opened. The heating network produces about 17.000 MWh of heat from regional wood chips.

The BLTC is part of the eco-modell Achental association, a regional network connecting renewable energy, agriculture, nature conservation and tourism. Partners are coming from public institutions, companies, scientific institutes, suppliers and consumers.



**Picture 9: Network scheme of Bioenergy Region Achental. Reference: Graph: Biomassehof Achental.**

The BLTC contains a logistic center for the mobilization of regional bio-energy resources and works on the development of new bio-energy projects and awareness rising to the public.

The BLTC is commissioned by the municipality to operate the district heating plant and network and manages also a 3.5 Ha short rotation plantation nearby. Currently 7 employed persons work in fulltime and 2 in half-time.

The services include the delivery of packed certified pellets and various qualities of wood chips and firewood. Wood chips are produced directly by the BLTC using wood from regional and sustainable forestry. Pellets are produced in the border region of Austria, which depicts a regional supply. Municipal and private wood residues are collected. On spot wood chips are dryed in storage halls.

Factsheet:

| | |
|---|---|
| Operation started | Experience in trading of biofuels since 2007, established as goal of the RES-integration project (http://www.res-integration.com/) |
| Owners/members | Public-private-partnership |
| Number of employees: | 7 employees in fulltime, 2 in half-time |
| Customers | Regional and certified Firestixx-wood pellets provider/trader, the Biomassehof Achental and its' partners are acting as a consultant for private households and public partners in terms of choosing the right heating system |
| Products and quantities: | Premium wood pellets (10.000 t/a) and all qualities of wood chips (40.000 SRM/a), firewood, briquettes, horse bedding |

*Positive aspects in establishment and operation:*

- The eco model region „Ökomodell Achental e.V." is a proven model that can be applied in other regions and countries as well.
- The bioenergy region Achental is working on a common goal to increase the business sector of renewable energies and to promote the building of regional networks aiming at an economical regional development in rural areas. The main stakeholders are cooperating with each other: entrepreneurs and politicians work on the region´s development and the achieved success provides an international best practice example.

## 1.5 Best practise examples from Slovenia[5]

**BIOMASA d.o.o.**

[5] http://bioresproject.eu/wp-content/uploads/2015/09/deliverable_3.1_web_ENG_V2.pdf

BIOMASA d.o.o. is a large BLTC center in Savinjska region and it's owned by a private entrepreneur in the form of a limited liability company, with one shareholder.

BIOMASA Nazarje was developed as a part of the company which sales and maintains heating boiler systems for biomass district heating systems and households. It offers the whole spectrum of services, consulting and optimizing heating systems, develop and maintain large biomass district heating systems and offer boilers for firewood, pellets and wood chips. The company is interested to increase the number of customers and wants to in invest in district heating systems based on local biomass.

**Picture 10: BLTC Biomasa d.o.o. Photo: Biomasa d.o.o.**

The company has four main pillars in its business operation:

1) Sales of boilers
2) Installation and service for boilers and devices
3) BLTC – physical storage place with production of pellets and facilities for drying
4) BLTC – Sales of pellets and wood chips (contract deliveries as part of the BLTC)

The main reason for BLTC establishment was that there was a raise of demand for wood fuels for customers that install larger boilers (for public buildings or small scale district heating). The customers need reliable supply, and BIOMASA d.o.o provides this kind of supply for their customers. The main benefit for their customers is that there is one company in the area for full service: biomass provider and services for boilers and heating systems. For BIOMASA d.o.o. the BLTC operations diversify their activities. The company has contracts with local forest owners for wood supply, and use wood remains from local wood processing industry.

Factsheet:

| | |
|---|---|
| Operation started | 2008 |
| Owners/members | Private owned company by an entrepreneur |
| Number of employees: | 5-10 depending on the season |
| Customers | Local and regional biomass users; district heating companies, households |
| Facilities: | 50.000 m2 open areas for storage<br>7000 m2 of covered areas for storage and production<br>Transmission equipment for dosing and loading<br>Central control system for monitoring biomass quality and quantity<br>2 flow drier for drying wood chips<br>Flow facilities for the preparation of raw material for pellets<br>Pellet mill, with a capacity of 1500 kg per hour<br>Packaging device for pellets<br>2 front loaders, 2 trailers, 2 chippers (large scale) |
| Products and quantities: | 170,000 m3 natural dried wood chips per year<br>80,000 m3 technically dried wood chips per year<br>10,000 tons of pellets per year |

*Positive aspects in establishment and operation:*

- Location is in highly forested area.
- BLTC is very cost efficient centre – heat for drying woodchips is a by-product of their own electricity cogeneration from biomass (by wood-gasifier).
- The BLTC has supply contracts with local and smaller forest owners.
- The customer base existed before BLTC was opened, so the BLTC has a secure market and good market position.
- BLTC is connected with customers of boiler sales. The BLTC is also connected with local wood processing industry.

*Challenges:*

- Number of smaller users is limited.
- Location is away from more populated areas.

**BIOFIT d.o.o.**

BIOFIT d.o.o. is a private limited liability company, located in central Slovenia. The main service of the BIOFIT is the production and sale of woodchips, they offer whole spectrum of services including delivery. The company has two owners.

The owners changed from farming to forestry and invested in forest machinery, mainly for production of woodchips. BIOFIT has own storage areas in an old-farm building.

Their main customers are local district heating companies that have biomass boilers. Main source of biomass are forest companies, agrarian and pasture communities and larger forest owners. With wide range of operation (whole central Slovenia), the BLTC is flexible. In

addition to local forest owners, BIOFIT finds business opportunities at longer distances. As a family based company, BIOFIT employs 3-4 employees depending on the season.

Factsheet:

| | |
|---|---|
| Owners/members | Private owned company |
| Number of employees: | 3-4 fulltime employees, one person manages the BLTC |
| Customers | Local and regional biomass users; district heating companies, households |
| Facilities: | 30.000 bulk m2 of storage facilities (mainly open)<br>Forestry excavator YUCHAI YC35-8<br>Forestry mulchers AHWI<br>Articulated trailer Novotny LVS 5000<br>Chipper Starchl 86 MK<br>Chipper Silvator 2000<br>Transport trailer with movable base MB Actros<br>Schwarzmüller semi-trailer truck<br>Volvo truck and trailer Hüffermann container trailer KRAMPE nine containers<br>trailer FLIEGL ASW 160 |
| Products and quantities: | 170,000 m3 natural dried wood chips per year<br>80,000 m3 technically dried wood chips per year<br>10,000 tons of pellets per year |

*Positive aspects in establishment and operation:*

- BLTC is located in a highly populated area.
- Most of the customers are from local area.
- Due the size of the company, BIOFIT is very flexible in their operation.

*Challenges:*

- A lot of material is delivered to customers directly from forests as they do not have large storage capacity.

# 2. SWOT Analysis: adaptability of good practise BLTC examples to priority area specific conditions in Bulgaria, Croatia and Serbia

## 2.1 SWOT description

A SWOT is a planning method and tool to evaluate strengths (S), weaknesses (W), opportunities (O) and threats (T) of a business action or a project. This SWOT analysis aims to identify the key internal and external factors of the selected priority locations for developing new BLTCs regarding the business environment, market potential and organisation's own internal resources of potential BLTC operators based on the perceived potentials and limitations of transferability of presented best practice examples.

The description of a SWOT matrix:


- Strengths: characteristics of the priority location fora BLTC that give it an advantage over others.
- Weaknesses: characteristics that place the priority location for aBLTC at a disadvantage relative to others.
- Opportunities: elements that the priority location for BLTC could exploit to its advantage.
- Threats: elements in the environment that could cause trouble for the priority location for BLTC development

By conducting the SWOT analysis, stakeholders of a priority location evaluate external threats and opportunities at the same time with internal strengths and weaknesses. Evaluation of organization internal resources together with organization's success factors (for instance economic figures of operation or good quality management) will help the organization to face challenges set by the markets and operational environment. The evaluation of internal resources of organization consist e.g. of products and/or services, distribution and customer networks, delivery options, critical evaluation of management systems, processes and personnel. In addition to present state, it's important also to evaluate, how internal resources and external factors develop over time.

The purpose of the SWOT analysis and following synthesis is to help local stakeholders in implementing countries to identify important factors concerning the local operating and business environment. As a tool, SWOT analysis is not a direct decision making tool, but it delivers important and valuable information concerning the internal and external factors of business models to be taken into consideration in the decision making process.

## 2.2 Application of SWOT analysis in priority area workshops

The SWOT analyses were carried out in workshops which were organized for local stakeholders in priority locations in Bulgaria, Croatia and Serbia. The purpose of the workshops was to bring local actors such as investors and operators together for formation of local BLTC consortia and introduce the concept of BLTC with the presentation of European best practice examples and business models.

All together 16 workshops in Bulgaria (4), Croatia (6) and Serbia (6) were organized during September, October and November 2015.

For presentation of best practice examples from Austria, Finland, Germany and Slovenia (see Chapter 1) for workshop participants, best practice examples were grouped under the three business models:

1) Energy cooperative
2) Limited Liability Company
3) Networking company

After presentation, a SWOT was carried out in two phases:

1. **Phase: SWOT analysis of a priority location**.
   The workshop participants fill jointly the SWOT matrix by discussing strengths, weaknesses, opportunities and threats of a priority location concerning the establishment of a BLTC.

2. **Phase: SWOT of best practice examples business models from Austria, Finland, Germany and Slovenia for transferability in Bulgaria, Croatia and Serbia**
   The workshop participants fill jointly the SWOT matrix by discussing the strengths, weaknesses, opportunities and strengths of transferability of case examples/business models in priority locations

This report summarises the results of the SWOT analysis. From the first phase, SWOT of a priority location, the country level synthesis is developed to highlight the main aspects of the operating environment arised in the workshops. The synthesis of SWOT from the second phase of selected good practise examples' business models, highlights the main factors which were identified by the workshop participants.

It is important to notice the differences of business models when reading the SWOT synthesis. Some of the identified factors (such as 'illegal logging' for instance) might be identified as a threat for a limited liability company which is buying the woody biomass. At the same time it is not relevant for another business model utilising forest biomass from it's members of a cooperative being forest owners.

## 2.3 Results of SWOT analysis

### 2.3.1 In Bulgaria

*Synthesis of SWOT phase 1*

As an internal strength in Bulgarian priority locations, private forest owners and biomass producers are motivated to work and develop the use of forest biomass as there are market

potentials and customers exist. As a weakness, there is a lack of knowledge and human capital in the field of forestry, and also infrastructure such as forest road network is not developed. Also, the support from local authorities is weak or does not exist at all.

As an external opportunity, there is lots of unused forest biomass which could be utilized for energy production. Moreover, there are also existing district heating networks with plans for fuel switch to biomass. The public opinion is positive towards new businesses and the use of bioenergy. However, the lack of financing possibilities, heavy bureaucracy and strong support for natural gas can be seen as main threats.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Internal Factors** | - Private forest owners (forest cooperation) and biomass producers are motivated to engage further<br>- Potential market and customer base<br>- The volume of potential biomass produced may satisfy and exceed the consumers' demand in the region<br>- Existing old and unused local heating installation and distribution network<br>- Potential production sites are visible from and near main road | - No understanding of the quality and prices of woody biomass/raw material<br>- Lack of well-developed forest roads and difficult access to woody biomass/raw material<br>- Local people are not motivated to work in forest sector<br>- Lack of trained and experienced staff<br>- Lack of interest from the municipal authorities<br>- No availability for external financing |
| | **Opportunities** | **Threats** |
| **External Factors** | - Availability of large volume of waste wood material in the local forest lands<br>- Positive public opinion: appreciation of all economic, social and environments effects<br>- Willingness of households and commercial consumers to switch to use of bio-energy products | - Many bureaucracy barriers faced in wood logging, wood process and wood transport stages<br>- No availability for external funding:<br>• no available EU programme-based funding<br>• complex loan application procedure before commercial banks<br>• Local Heat plant do not see financial stimuli to switch from natural gas to wood<br>- Not many potential consumers can afford the cost of remodelling or making of biomass installations<br>- No support from local authorities – the support is to natural gas. |

*Synthesis of SWOT phase 2*

Several internal and external factors were common for all three business models in Bulgaria. Existing heating networks and power plants were seen as strength although market development on the demand side is needed. Positive public opinions towards development and use of bioenergy and availability of unutilized raw material were identified as main opportunities. The common challenges for business models are the lack of skilled or motivated workers, poor forest road infrastructure and the absence of municipal level decisions to switch to biomass in energy production. Also many bureaucracy barriers and

lack of external financing for modernization of local district heating networks was seen as a threat for business.

The own woody biomass production was seen as strength for the energy cooperative case models. The weakness is that even though there are existing district heating networks, there might not be an existing customer base as the district heating network is not in use, or continue to use fossil fuels such as natural gas. As a weakness, there is no common understanding about the prices and quality of produced biomass. Easier logistic management and trade of products for consumers were seen as an opportunity of the energy cooperative business model.

For limited liability company business models, the main strengths were that there is already interest towards an establishment of a BLTC company by local forest owners and biomass producers.

The main strength for networking company model is the own bioenergy production with own machines through the supply chain. Also as business model, partnership between companies is a common form of commercial business as it has low establishment and accounting costs. Cooperation with other companies in forest operations is often a challenge and requires the will in establishing trustful relations.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Internal Factors** | **Common for all business models:**<br>- Existing heat network and heat power plants<br><br>**Energy cooperatives**<br>- Availability of some own and basic production site, wood chips machinery and transport equipment<br>- The volume of potential biomass produced may satisfy and exceed the consumers' demand in the region<br>- Existing, experienced forest cooperation<br><br>**Networking company:**<br>- Availability of some own and basic production site, wood chips machinery and transport equipment<br><br>**Limited Liability partnership**<br>- The most common form of commercial legal entity in Bulgaria--> low establishment and accounting cost<br>- Existing, experienced parties<br><br>**Limited liability company:**<br>- Certain interest expressed by some single entities (private forest owners (forerst cooperations) and biomass producers) to develop the idea of BLTC<br>- The process of switching to use of bio-energy products for heating purposes by households and commercial consumers has already started--> Potential customers | **Common for all business models:**<br>- Lack of well-developed forest roads and difficult access to forest wood waste<br>- Municipality have not decided yet to switch to biofuel<br>- Local people are not motivated to work in the forest sector<br>- No available own funds for optimization and modernization of wood chips machinery and transport equipment<br>- Restoration of old network requires significant funding<br><br>**Energy cooperatives:**<br>- Lack of municipal distribution network<br>- No potential heat consumers or markets in the area<br>- Participation of the forest cooperatives in other legal entities is not viewed positively by all cooperative members<br><br>**Networking company:**<br>- Lack of municipal distribution network<br><br>**Limited liability company:**<br>- Different opinions among local private forest owners, biomass producers and consumers about the quality and prices of woody biomass/ raw material<br>- Lack of interest from the municipal authorities<br>- Lack of trained staff<br>- Lack of cooperation between the pellet |

| | | |
|---|---|---|
| | - Potential production sites are visible from and near main road<br>- The volume of potential biomass produced may satisfy and exceed the consumers' demand in the region | producer and the local forest owners |
| **External Factors** | **Opportunities** | **Threats** |
| | **Common for all business models:**<br>-Positive public opinion: appreciation of all economic, social and environments effects<br>- Availability of large volume of waste wood material in the local forest lands<br>- Intolerance to illegal forest activities<br>- Willingness of households and commercial consumers to switch to use of bioenergy products<br>- The state as a forest owner and via its national executive authority is willing to consult and provide an expertise<br><br>**Energy cooperatives:**<br>- Consumer cooperation for easier logistics and trade with wood energy products<br>- Biofuel storage for renting to consumers | **Common for all business models:**<br>- Many bureaucracy barriers faced in wood logging, wood process and wood transport stages<br>- At present no availability for external funding:<br>- No available EU programme-based funding<br>- Complex loan application procedure before commercial banks<br>- The restoration and modernisation of the local heating network needs external funding<br>- Not many potential consumers can afford the cost of remodelling or making of biomass installations<br>- Low support from local authorities |

### 2.3.2 In Croatia

*Synthesis of SWOT phase 1*

The main internal strengths and external opportunities were related to the biomass potential and new potential investors on new markets in Croatian priority locations. Also the infrastructure was identified as strength. The lack of human resources and organizational capacity were recognized as main internal weaknesses. Legal framework, financing and past historical experiences from cooperatives were seen as external threats on the priority locations.

| | | |
|---|---|---|
| **Internal Factors** | **Strengths** | **Weaknesses** |
| | - Biomass potential<br>- Potential markets and biomass district heating functions<br>- Potential investors<br>- Developed infrastructure | - Lack of organizational and managerial capacity<br>- Lack of human resources and knowledge<br>- Undeveloped regions and low population |
| **External Factors** | **Opportunities** | **Threats** |
| | - Potential new investors<br>- New markets in Croatia<br>- New jobs<br>- Higher woodchip prices | - Legal framework<br>- Financing<br>- Past experiences about cooperatives |

*Synthesis of SWOT phase 2.*

The potential of new markets, market development and support from communities was identified as main opportunity and strength for all business models in Croatia.

As strengths for the cooperative model, interested forest owners exist and there is also potential for district heating, which fits well for the energy cooperative business model. In addition, communities are also willing to support the district heating. More use for local forest resources and benefits (jobs) derived from it were seen as opportunities, but there is also a threat, that there is not enough market demand for cooperative's business. Lack of knowledge and human resources are weaknesses for the establishing a cooperative.

For limited liability business model, there are already interested investors in some of the priority locations, but on the weaknesses side, there is also a lack of finance and human resources and knowledge. Social benefits (jobs and prevention of depopulation) were seen as an external opportunity, but also some negative aspects like illegal logging and market conditions were recognized.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Internal Factors** | **Common for all business models:**<br>- Community support<br><br>**Energy cooperatives:**<br>- interested forest owners (support)<br>- Potential markets and biomass district heating functions<br><br>**Limited Liability Company:**<br>- Potential interested investors (and other parties) in BLTC development<br>- Existence of priority location<br>- Forest management practices<br>- Private initiative | **Energy cooperatives:**<br>- Lack of human resources and knowledge<br><br>**Limited Liability Company:**<br>- Lack of finance<br>- Lack of human resources and knowledge |
| | **Opportunities** | **Threats** |
| **External Factors** | **Common for all business models:**<br>- Potential new markets & market development<br>- Social benefits (depopulation, jobs)<br><br>**Energy cooperatives:**<br>- Utilization of private forests | **Energy cooperatives:**<br>- Lack of interest in the market<br><br>**Limited liability companies:**<br>- Illegal logging<br>- Undeveloped markets |

### 2.3.3 In Serbia

*Synthesis of SWOT phase 1*

The main strengths in Serbian priority locations are biomass potential, rather well developed infrastructure and the existence of potential biomass users. Also, communities are supporting the use of biomass for energy production. As weaknesses, human capital, knowledge, and finance are lacking and the local market need to be further developed. As an

opportunity, the use of forest biomass is seen as a source of income and employment and environmental benefits are also recognized. The insecure market situation due to the fossil fuel prices, bureaucracy and illegal logging can be seen as a threat for bioenergy utilization.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Internal Factors** | - Biomass potential<br>- Developed infrastructure<br>- Potential users and markets<br>- Several potential locations for BLTC`s<br>- Community support and spirit<br>- Available land | - Lack of awareness<br>- Lack of human resources and knowledge<br>- Lack of finance<br>- Lack of access to available resources (woody biomass, residues)<br>- Insufficient support from local government<br>- Undeveloped market |
| | **Opportunities** | **Threats** |
| **External Factors** | - Employment opportunities<br>- Developing demand and markets<br>- Environmental measures and benefits<br>- Changes in the legal framework | - Insecure markets (fossil fuel use, fossil fuel prices)<br>- Unfair competition/Illegal logging<br>- Bureaucracy<br>- Lack of political support |

*Synthesis of SWOT phase 2*

Developing local markets and the large potential of woody biomass consumption were identified as main opportunity for all business models In Serbia.

As strength for the energy cooperative model, the biomass potential and possibilities to provide raw material were identified. Also, knowhow and experience derived from the experience of members, risk sharing and competitiveness were seen as strengths. On the weakness side, there are bad experiences with cooperatives due to historical reasons of communist times and cooperative management structure is complicated. However, developing trust for cooperative model was seen as an opportunity also. Other external positive opportunities are the developing market situation with new requirements for emissions and environmental regulations. Lack of municipal support, legal framework and market conditions were seen as threat for energy cooperative model. Also, a lack of district heating customers was seen as a market based threat for energy cooperatives.

As strength for a limited liability company model, simple management and quick decision making were seen as strengths. Although biomass potential exists, there might be difficulties in providing raw material. The developing market situation and increased awareness are opportunities. Illegal logging and unfair competition as well as insecure market situations were recognized as threats.

| | Strengths | Weaknesses |
|---|---|---|
| **Internal Factors** | **Energy cooperatives:**<br>- Biomass potential<br>- Possibility to provide raw materials<br>- Knowhow and experience<br>- Financial capacity<br>- Risk sharing<br>- Competitiveness<br>- Added value<br><br>**Limited liability company:**<br>- Quick decision making<br>- Simple management<br>- Business model is wide-spread- Financial capacity<br>- Biomass potential<br>- Large potential consumers<br>- Developed infrastructure<br>- Possibility to supply also other countries (Priboj)<br>- Developed network of suppliers(Priboj) | **Energy cooperatives:**<br>- Bad experiences with cooperatives and mergers<br>- Complicated management structure in cooperatives<br>- Inadequate legal regulations<br>- Large investments in the district heat network needed<br>- Not enough potential investors<br>- No public interest or support<br><br>**Limited liability company:**<br>- Difficulties in providing raw materials<br>- Unfair competition/illegal loggings<br>- Potential BLTC sites limited(Priboj)<br>- No operational consumers(Priboj)<br>- Forest machinery inadequate and outdated (Priboj) |
| | **Opportunities** | **Threats** |
| **External Factors** | **Common for all:**<br>- Increased awareness<br>- Developing demand and markets<br>- Large potential consumption in the future<br>- Increase of forest biomass use<br><br>**Energy cooperatives:**<br>- Cluster development<br>- Developing trust in cooperatives<br>- Developing demand and markets<br>- New emission and environmental regulations<br>- Professionalization<br>- Potential need in rural areas without DH network<br>- Cooperative can manage forests | **Common for all:**<br>-Legal framework, complicated regulations<br><br>**Energy cooperatives:**<br>- Market conditions; no customers for district heat<br>- Lack of municipality support/mentality<br>- Weak commercial activities in rural areas<br><br>**Limited liability company:**<br>- Illegal logging/unfair competition<br>- Lack of wood supply/wood delivery contracts<br>- Lack of political support<br>- Poor infrastructure<br>- Possible price increase when demand increases |